AVIFAUNA OF THE KAITUNA VALLEY RESERVE, BANKS PENINSULA, NEW ZEALAND

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ABSTRACT

Eight native and 12 introduced bird species were recorded in a survey of the Kaituna Valley Reserve, Banks Peninsula, New Zealand. The population in the 6 ha reserve was estimated at 127 pairs, which is comparable with similar areas in other modified forest environments in New Zealand. The Bird Species Diversity is also comparable to that obtained in modified native forest.

INTRODUCTION

The Banks Peninsula Study Research Programme was established by one of us (DJR) in 1976 as a framework about which to organise study-research courses on aspects of the biology of the area. The object of this study was to assemble quantitative and qualitative baseline data on the avifauna of one of the few remaining forest remnants in the area (Kaituna Valley Reserve, Fig. 1) using adult students as research assistants. Participants in such study-research courses receive sufficient initial instruction to qualify them as "research assistants", and learn thereafter from their own collection of scientific data, and more practical instruction throughout the course.

STUDY AREA

The Kaituna Valley Reserve is 6 ha in area, located on the southwest slopes of Banks Peninsula (NZMS 1, S 84:046317).

The vegetation is predominantly matai/secondary growth titoki-mahoe mixed broadleaf forest with scattered surviving kahikatea (Kelly 1972). Canopy height is approximately 9 m. The area is fenced from surrounding farmland, and, on its western margin in particular, supports a rich growth of exotic grasses. Shrubs, flax (many of them planted), willows and macrocarparas are present on the edges of the Reserve (Kelly 1972).

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BANKS PENINSULA AVIFAUNA

At the time of European settlement Banks Peninsula was almost completely clothed in dense mixed forest (Turbott 1969). Between 1860 and 1900 much of this vegetation was systematically milled or deliberately burnt (Petrie 1963). The successful establishment of English pasture grasses, followed by the introduction of sheep and cattle finally reduced the former luxurious forest to tiny clumps of trees and secondary growth (Johnston 1969). The forest clearing on Banks Peninsula appears to have been more thorough than that in other parts of New Zealand, and was brought to an advanced state earlier than in other parts of New Zealand. Before the destruction of the original vegetation, the Peninsula supported a rich forest bird fauna (Turbott 1969). Ten species of bird have disappeared from the Peninsula - the south island thrush (*Turnagra capensis capensis*), south island kokako (*Callaeas cinerea cinerea*), south island saddleback (*Philesturnus carunculatus carunculatus*), yellowhead (*Mohoua ochrocephala*), south island robin (*Petroica australis australis*), south island bush wren (*Xenicus longipes longipes*), red-crowned parakeet (*Cyanoramphus novaezelandiae novaezelandiae*), yellow-crowned parakeet (*Cyanoramphus auriceps auriceps*), kaka (*Nestor meridionalis meridionalis*) and weka (*Gallirallus australis hectori*), (Turbott 1969) Other species, the south island rifleman (*Acanthisitta chloris chloris*), yellow-breasted tit (*Petroica macrocephala macrocephala*), and tui (*Prosthemadera novaeseelandiae novaeseelandiae*), although still present, are probably not as common as they were before the modification of the forest by man. The few reports of morepork (*Ninox novaeseelandiae*) and New Zealand falcon (*Falco novaeseelandiae*) suggests that they are the rarest of the endemic land birds in the area (G.A.T. unpublished data).

The number of native bird species is known to decline with increasing forest modification, in order; virgin forest to modified exotic forest to suburban bush and gardens (McLay 1974). Documentation of change in the avifauna of the Peninsula is commonly observational (e.g. Dawson and Creswell 1949). To the knowledge of the present writers, there is no published quantitative information on the avifauna of the original forests on the Peninsula, or the present remnants.

METHODS

CLASS PREPARATION

A class of 25, ranging in age from 18-70+ years, enrolled for the course. Bagnall (1977) found that a prerequisite requiring all participants to be able to identify birds by sight and sound discouraged support of an ornithology study-research project. Although some participants in this project already possessed the necessary skills, the entire class undertook the full programme of 5 meetings:

1. a 2 hour lecture/discussion on sampling techniques (described below) and bird identification.
2. a 2 hour session on bird identification based on mounted specimens in the Canterbury Museum, calls and sightings of live birds in the Christchurch Botanic Gardens.

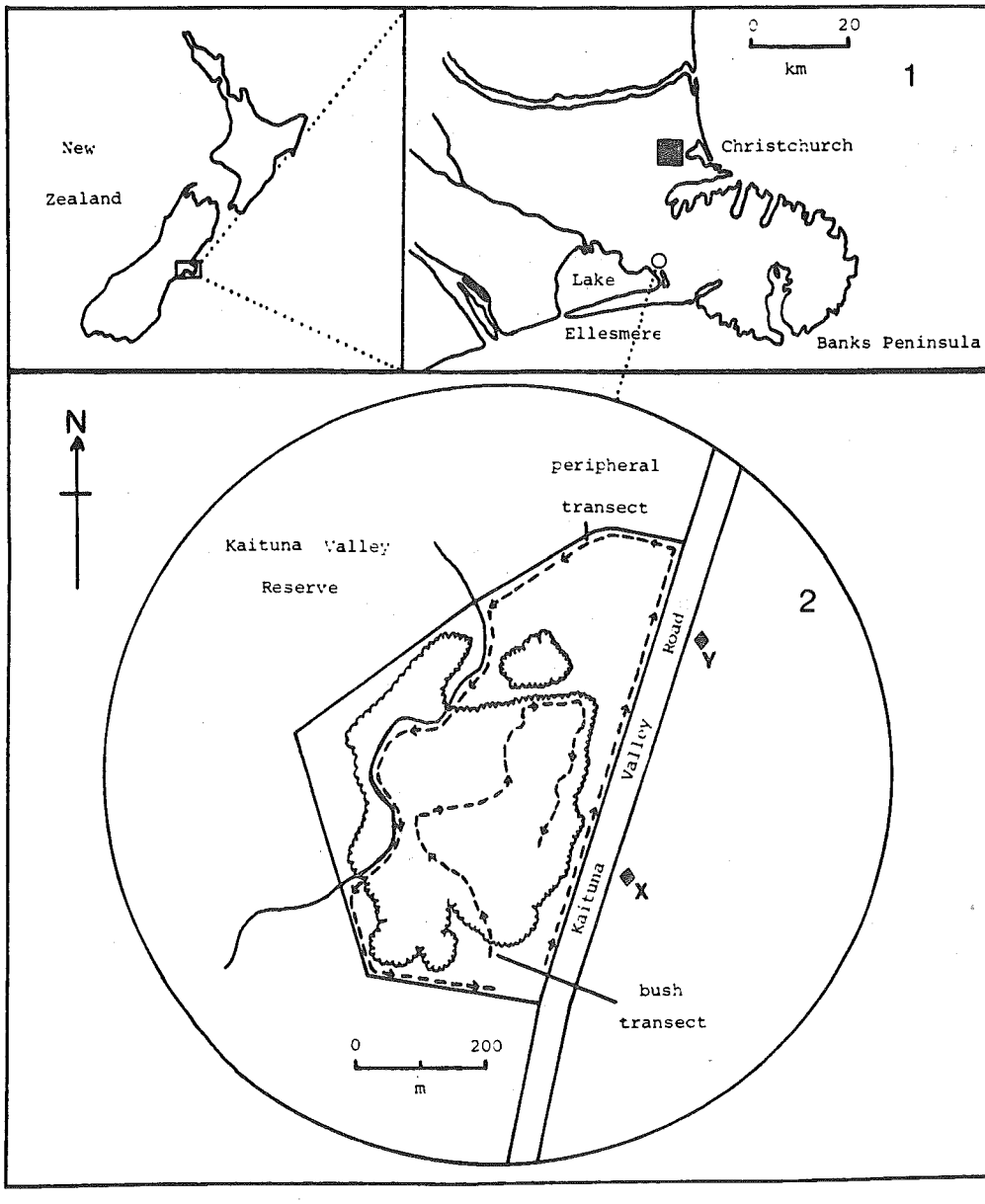

Fig. 1. Banks Peninsula showing the location of the study area.

Fig.2. The Kaituna Valley Reserve, showing the positions of the two static sampling groups, and the course of the two transects.

3. a familiarisation with the Kaituna Reserve and sampling practicalities.

4&5 two 2 hour sessions in the Reserve assembling population data.

SAMPLING METHODS

The class was divided into four approximately equal groups (A, B, C, D) and field data collected for 1 h between 1000 h - 1200 h on 29 April and 6 May. Bird species were identified either by sight or call, or both, in three sampling areas, viz.

a. Kaituna Valley Roadway: For the 29 April survey, groups B and C were stationed at x and y respectively (Fig.2). To account for any bias between groups arising from differing ability to identify species, groups were interchanged between the two survey sessions. Hence, for 6 May survey, groups A and D occupied x and y respectively. Data assembled here were primarily qualitative.

b. Peripheral Transect: Groups D and C undertook the task on the two survey occasions. This consisted of assembling mainly qualitative records of species noted from the transect around the bush margins (Fig.2). Data from this area and the roadway were collected to check on possible differences in species composition between the margins and interior of the bush.

c. Bush Transect: This work, undertaken by groups A and B respectively, involved following a bush transect (Fig.2, marked by metal discs attached to trees) using the quantitative line transect technique developed by Balph *et al.* (1977). This was considered a practical way of overcoming many of the problems encountered in surveys of this kind (see Gibb 1966, Dawson and Bull 1975, Balph *et al.* 1977).

Bird density was calculated from bird counts on the bush transect, averaged for two surveys, using the formula of Balph *et al.* (1977).

$$D = \frac{n}{l \times d \times 2} \times \frac{10^6 \ m^2}{km^2}$$

where D = bird density (no./km^2)

n = number observed between transect line and the outside edge of the last interval used in the density estimate

l = transect length (m)

d = distance (m) from the transect line to the outside edge of the last interval used in the density estimate.

An index of bird species diversity (b.s.d.) was calculated using the formula derived by McLay (1974).

$$H = \sum_{i=1}^{i=s} p_i \log_e p_i$$

p_i is the proportion of the total numbers belonging to the ith species, and s the number of species. H is a measure of the diversity per individual (Pielou 1969, cited by McLay 1974).

Further to the basic survey, all groups estimated the height above ground at which birds were first sighted. During each survey, G.A.T. kept a casual record of sightings as a check against the species lists compiled by participants.

RESULTS AND DISCUSSION

The species recorded during the survey are shown in Appendix 1. A substantial measure of agreement exists between species recorded by G.A.T. and the participants. Only *Lobibyx novaehollandiae* (spur-winged plover) and *Halcyon sancta* (kingfisher) (sighted just outside the reserve) and *Hirundo tahitica*, remained undetected by the participants. The various groups of observers therefore would appear to have achieved a reasonable degree of accuracy in identification of most species in the area. Non-migratory native bush birds which occur on Banks Peninsula but were not recorded in the reserve included: yellow-breasted tit, brown creeper, rifleman, tui, New Zealand pigeon, morepork and the New Zealand falcon.

The numbers of species recorded on the bush transect during the two surveys are shown in Table 1. Substantial differences in numbers between the surveys may relate to two factors. Strong winds on 29 April may have forced some species to shelter in the area e.g. Californian quail, fantails, blackbird and bellbird. These differences may also represent the population flux characteristic of forest remnants situated in farmland, although this could be confirmed only by more extensive sampling of the forest and surrounding area.

Gibb (1966) observed that a sampling method similar to that used here tends to over-emphasize less common species. This possibly natural tendency, together with the difficulty of sighting all individuals, is a potential source of error in this survey.

The methods of identification upon which the species list and density estimate are based are shown in Table 2. Overall, all groups identified the majority of birds visually. On the first day of the census, no birds on the bush transect were identified by calls alone. Table 2 also gives the range of and mean heights at which birds were first sighted. On 29 April all individuals on the bush transect were sighted no more than 15 m (median 4 m) above ground, probably due to the strong north east winds at that time. The following week, 63% of all individuals on this transect were identified from calls, and birds were recorded at heights between 1 m and 60 m (median 20 m) on initial sighting. The percentage of birds unidentified did not exceed 24.6%, and most of these were finches. Considering

TABLE 1. RESULTS OF BIRD CENSUS, KAITUNA VALLEY RESERVE APRIL-MAY 1978: SPECIES RECORDED ON BUSH TRANSECT

Species	Number in Reserve* 29 April	6 May	Mean Number*
Fantail *(Rhipidura fuliginosa)*	146	22	84
Grey Warbler *(Gerygone igata)*	73	88	81
Blackbird *(Turdus merula)*	15	2	9
Bellbird *(Anthornis melanura melanura)*	25	15	20
Californian Quail *(Lophortyx californica)*	73	-	37
Silvereye *(Zosterops lateralis)*	43	56	50
Goldfinch *(Carduelis carduelis)*	-	4	2
Hedgesparrow *(Prunella modularis)*	-	6	3
Chaffinch *(Fringilla coelebs)*	-	15	8

* Based on formula in Balph *et al* (1977)

TOTAL 294

TABLE 2. A SUMMARY OF FIELD DATA (METHODS OF IDENTIFICATION, COUNTS, NUMBERS OF SPECIES, HEIGHTS, AT WHICH BIRDS FIRST SIGHTED) ASSEMBLED BY THE 4 GROUPS IN THE KAITUNA VALLEY RESERVE

	Roadway				Peripheral Transect		Bush Transect	
	29 April		6 May		29 April	6 May	29 April	6 May
GROUP	B	C	A	D	D	C	A	B
Number of birds	36	96	83	144	51	118	27	26
Number of species	11	12	10	15	11	13	6	10
% of known birds identified from calls	21	44	nil	32	60	37	nil	63
% of known birds identified from sightings	79	56	100	68	20	57	65	37
% of known birds identified by voice and sighting	nil	nil	nil	nil	20	6	35	nil
% of birds unidentified (all species)	4	24.6	nil	11	9.1	8.2	nil	nil
% of finches in unidentified category	4	17.4	nil	10	9.1	7.0	nil	nil
Height first sighted (range) medians in brackets (metres)	nr	nr	2-100 (30)	1-40 (20)	1-100 (18)	6-20 (12)	ground-15 (4)	1-60 (20)

nr = unrecorded

the positive nature of both counting and identification, together with the fact that results were assembled by groups as opposed to the usual pattern of individual observers, there is every reason to be confident in the species list and numerical data.

Using the formula of Balph *et al.* (1971), we estimate that the Kaituna Reserve supported a population of 147 pairs of birds, or 24.5 pairs per ha. This density (equivalent to 980 pairs per 40 ha) compares with areas of the Christchurch Botanic Gardens, which support up to 993 pairs per 40 ha, (East 1967, cited by McLay 1974) and is not substantially greater than the 770 pairs per 40 ha given by McLay (1974) for suburban bush and gardens. Our figures may have been influenced by:

1. the number of birds which took shelter during the high winds of 29 April,

2. behaviour patterns such as sheltering during the day and feeding in the surrounding patches of bush, scrub and open country during dusk and dawn,

3. the difficulty of recording birds in the upper canopy e.g. starlings (hence their omission in the calculation of the B.S.D.).

However, we believe our estimates were more accurate than in most similar surveys due to the greater numbers of observers.

The B.S.D. of 1.35 calculated for the 9 species identified in this study is comparable to that obtained by Choate (1965) for modified native forest in Jackson's Bay (South Westland) (1.27) and Stewart Island (1.47, Choate and Gibbs 1964), although substantially less than that given by McLay (1974) for suburban bush and gardens (2.08).

Little information exists about the avifauna of bush remnants on the Peninsula. Dawson and Cresswell (1949) recorded a total of 33 species in nearby Governor's Bay and noted that for example the grey warbler, bellbird and tui were all common in that area at the time. Because of the nature of their records, any comparison with results of the present study is difficult, although only the first two species were recorded from the Kaituna Reserve. The 33 species recorded by those authors, however, would probably have produced a greater B.S.D. than that calculated for this study. Further research is necessary to determine whether or not the low BSD/high population density of the Kaituna Reserve is characteristic of other forest remnants on Banks Peninsula. Clearly, however, this reserve supports a substantial bird population. Surveys of the avifauna in other forest remnants, and areas of exotic planting, together with results of the present study, might provide information which could be used to assess the importance of forest remnants to the species of native birds surviving on Banks Peninsula.

These results also provide evidence of the feasibility and value of involving adult students in study-research projects of this nature, regardless of their initial level of ornithological training.

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APPENDIX I. BIRD SPECIES RECORDED IN THE KAITUNA VALLEY RESERVE APRIL-MAY 1978 (NOMENCLATURE FOLLOWS THE OSNZ CHECK LIST 1970)

	Christchurch Botanical Gardens	Kaituna Valley Reserve							
			Roadway		Peripheral Transect		Bush Transect	
Date	22 April	29 April and 6 May	29 April	6 May	29 April	6 May	29 April	6 May
Group*	Whole Class	Casual record (G.A.T.)	B and C	A and D	D	C	A	B
White-faced Heron *(Ardea novaehollandiae)*		+		+	+			
Australasian Harrier *(Circus approximans)*		+	+	+				
Californian Quail *(Lophortyx californica)*		+	+	+	+		+	
Welcome Swallow *(Hirundo tahitica)*		+						
Hedge Sparrow *(Prunella modularis)*	++	+	+	+		+		+
Grey Warbler *(Gerygone igata)*	++	+	+	+	+	+	+	+
Fantail *(Rhipidura fuliginosa)*	++	+	+	+	+	+	+	+
Song Thrush *(Turdus philomelos)*	++		+	+				
Blackbird *(Turdus merula)*	++	+	+	+		+	+	+
Bellbird *(Anthornis melanura melanura)*		+	+	+	+	+	+	+
Silvereye *(Zosterops lateralis)*	++	+	+	+	+	+	+	+
Yellowhammer *(Emberiza citrinella)*		+		+		+		
Chaffinch *(Fringilla coelebs)*	++	+		+		+		+
Goldfinch *(Carduelis carduelis)*	++	+	+	+	+	+		+
Redpoll *(Acanthis flammea)*		+		+				
Greenfinch *(Cardnelis chloris)*	++	+	+			+		
House Sparrow *(Passer domesticus)*	++	+		+	+			
Starling *(Sturnus vulgaris)*	++	+	+	+	+			+
White-backed Magpie *(Gymnorhina tibicen hypoleuca)*		+	+	+	+	+		
Unidentified			+	+	+	+		

* The role of each group of observers is detailed under "Sampling methods"